
THE LIBRARY OF CONGRESS

Scientific Methods
OF
Tempering Steel

Compounds

For Welding and Restoring Burnt Steel

Compounds

For Hardening Steel
Case Hardening

Hardening Solutions

For Chills
For Ball Bearings

Compound

For Welding Copper

BY
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NUMBER 1

Tempering edge tools of all kinds—pocket knives, draw knives, spoke-shaves, adze, axes, wood planers, wood chisels, planer blades, hatchets, spoke augers, and all wood cutting tools.

Harden in Hot Linseed Oil.

Draw them to a Red and Blue.

NUMBER 2

Tempering tools for boring iron or steel—drills, bits, nippers, wire cutters, butcher's cleavers, blacksmith hammers, center punches, bolt cutters.

Harden in Hot Linseed Oil.

Draw them to a Dark Red or Wine Color.

NUMBER 3

Tempering chisels for chipping purposes—keyseat chisels and boiler maker's punches.

Harden them in Oil.

Draw them to Blue, Repeat 3 or 4 times on the Red.

NUMBER 4

Tempering marble cutter's tools—shears for cutting iron or steel or hard metals.

Harden them in Linseed Oil.

Draw them to a Copper Color.

NUMBER 5

Spring tempering — auto springs, wagon and buggy springs, all kinds of elliptic springs.

Harden them in Linseed Oil or Water.

Temper by Flash.

This can only be done when **oil** has been used in hardening. After plunging the spring in the oil return it to the furnace. When a **blue** flame appears hugging the metal, which is at about 600 deg. F., take it from the furnace and allow it to cool in the air. Do not put it back in oil or water. Small springs can be hardened in **Hard Tallow** or a bar of yellow **Soap.** Flash tempering is the best method and is more reliable than water tempering.

NUMBER 6

Tempering cold chisels such as track chisels and all-round chisels for general use.

Harden them in Water or Oil, according to size of tool.

Draw them to Blue, Repeat on the Red 3 or 4 times for tough tools.

NUMBER 7

Tempering stone cutter's tools such as tooth chisels, points and tools used

· dressing limestone or other build-
; stone of the same nature.
Harden in Hot Linseed Oil.
Draw them to a Blue.

NUMBER 8

Tempering rock drills, both heavy
d light stone hammers, stone picks,
ne sledges and other tools used in
:k quarries.
Harden them in Oil or Water.
Draw them to a Gold and Red or
Peacock Blue.
Repeat on the color for Tough Tools.

NUMBER 9

Tempering razors for barber's use.
Harden them in Hot Linseed Oil.
Draw them to a Gold Color.

NUMBER 10

Tempering taps for thread cutting.
Harden them in Hot Linseed Oil.
Draw them to Bronze Color.

NUMBER 11

Tempering dies for thread cutting.
Harden in Linseed Oil.
Draw to a Dark Gold or Copper Color.

NUMBER 12

Tempering reamers for machine shops.
Harden in Hot Linseed Oil.
Draw to a Gold and Red, Mix Colors.

NUMBER 13

Tempering dirks, knives, lances probes, physician's knives.

Harden in Hot Linseed Oil.

Draw to a Bright Red.

NUMBER 14

Tempering boring tools, mining tools, mill cutters, glass cutters, glass bits, files, butcher's steels, hack saws lettering tools used with a great degree of hardness.

Harden in Hot Linseed Oil.

Draw to no color at all.

NUMBER 15

Tempering lathe tools, planer tools and tools used for turning iron or steel and other metals.

Harden in Hot Linseed Oil.

Draw to a Light Straw.

NUMBER 16

Tempering grub hoes, coal picks coal augers and tools used in dust farrier's knives, etc.

Harden in Linseed Oil.

Draw to Blue No. 1.

NUMBER 17

Tempering butcher knives, bread knives, carving knives, paring knives and table cutlery.

Harden in Hot Linseed Oil.

Draw to Blue No. 2.

NUMBER 18

Chemical tempering for tools that nust be 10 or 15 degrees harder than)il or water can make them.

Harden in Quick Silver.

Draw No Temper at all.

NUMBER 19

Welding flux for welding tool steel.

Fine Salt .....¼ part
Clay .....¾ part

Use like you would Sand.

NUMBER 20

Receipt for welding high grade steel, and restoring burnt steel.

Borax .....1 lb.
Carbonate of Iron .....2 oz.
Black Oxide of Manganese .....3 oz.

Mix well and use like Borax.

NUMBER 21

WELDING HIGH SPEED STEEL

Charred Borax .....1 lb.
Carbonate of Iron .....3 oz.

Use like Borax.

NUMBER 22

Welding Bessemer and Openhearth steel.

Clean Sand .....5 lbs.
Powdered Sulphate of Iron .....3 oz.
Black Oxide Manganese .....3 oz.
Table Salt .....4 oz.

Use like Borax.

NUMBER 23

WELDING COPPER TUBING

Equal parts of Fine Table Salt and Borax.

NUMBER 24

TO DRILL CHILLED CAST IRON

First heat the part where it is to be drilled red hot, place a ferrule or nut over the part to be drilled fill it with brimstone. When the metal is cold it will be soft enough to drill.

NUMBER 25

HARDENING COMPOUND

Carbonate of Soda .....1 oz.
Cyanide of Potash .....1 oz.
Carbonate of Potash .....1 oz.

Heat the tool red hot. Sprinkle this on the tool and return it to the fire for a few seconds. Plunge it in solution. This will be very hard.

NUMBER 26

HARDENING COMPOUND FOR CAST IRON TOOLS

Salt ..... 2 oz.
Saltpeter .....½ lb.
Alum .....½ lb.
Salt of Tartar .....¼ oz.
Cyanide of Potash ..... 1 oz.
Carbonate of Ammonia ..... 6 oz.

Pulverize all together. Sprinkle it on the tool, plunge it in water. Draw no temper.

NUMBER 27

CASE HARDENING FOR TOOLS

Heat the steel red hot, sprinkle the following on the tool and plunge in water.

Pulverized Cyanide Potassium.
Pulverized Prussiate of Potash.

(This is Poison.)

NUMBER 28

HARDENING SOLUTION

Corrosive Sublimate	3 oz.
Salt	6 lbs.
Soft Water	4 gals.

(This Solution is Poison.)

NUMBER 29

HARDENING SOLUTION

Sal Ammoniae	6 oz.
Corrosive Sublimate	3 oz.
Soft Water	4 gals.

For all kinds of tools draw the temper as desired.

(This is Poison.)

NUMBER 30

HARDENING SOLUTION

Saltpeter	1 lb.
Prussiate of Potash	3 lbs.
Citric Acid	2 lbs.
Carbonate of Iron	2 lbs.
Salt	50 lbs.
Soft Water	30 gals.

This is one of the very best known.

NUMBER 31

Chills for cones, plates, ball bearings and other tools that must be chilled.

Aqua Ammonia	2 oz.
Common Soda	2 oz.
Common Salt	15 lbs.

To one barrel of water, heat and cool off in the solution for a chill.

NUMBER 32

ANGLE IRON RING

Outside ring with flange on the outside.

Multiply the diameter by 3.1416, add twice the width of flange to circumference, which will give the length; cut bevel of half the width of flange on both ends on the inside flange.

NUMBER 33

ANGLE IRON RING

Inside Ring, Flange on Inside.

Find circumference as usual (multiply diameter by 3.1416) deduct twice the width of flange, cut bevel on each end half the width of flange.

NUMBER 34

STEEL ANGLE OUTSIDE RING

Find circumference as usual, to this add two and one-half times the width of the flange, cut bevel the same as iron, one half the width of flange.

NUMBER 35

STEEL ANGLE INSIDE RING

Deduct only twice the width of ange. Steel will not gather like iron.

NUMBER 36

ORWAY IRON, ANGLE OUTSIDE RING

Add three times the width of flange ter finding the circumference.

NUMBER 37

NORWAY IRON, ANGLE INSIDE RING

Find the circumference as usual, educt two and one-half the width of ıe flange.

NUMBER 38

TEMPERING HIGH SPEED STEEL

Care should be taken in bringing it the proper heat, about 2000 to 2200 egrees Fahrenheit. White heat before ıenching. The above heat will not jure the steel.

For cooling, air blast, water and oil e used.

NUMBER 39

NNEALING CARBON STEEL IN WATER

Heat the steel to a dark red. When ıe red is passing off, hold the steel in dark place; when you see a dark red unge it in plain water or soap suds. his will make it very soft.

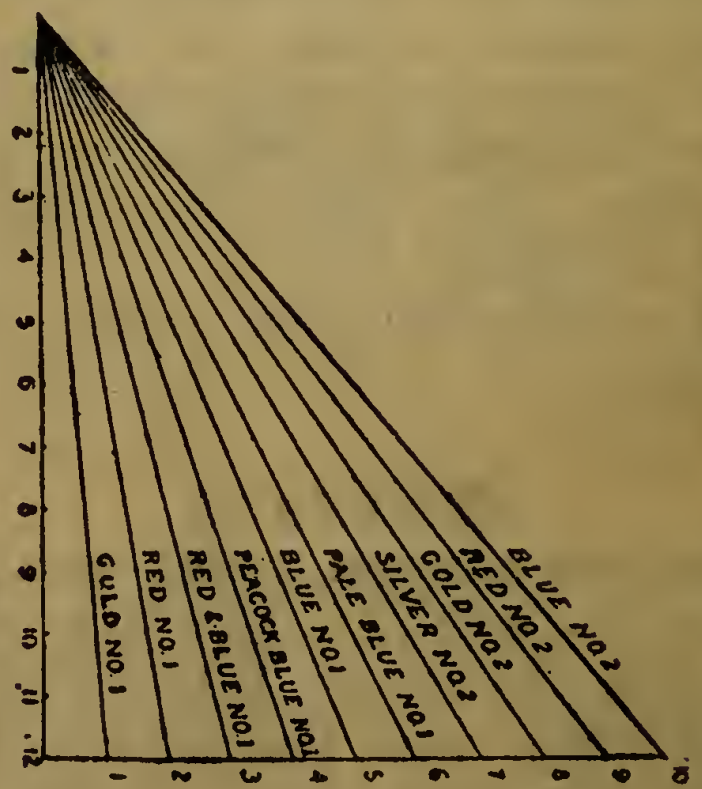
NUMBER 40

ANNEALING SMALL PIECES OF HIGH SPEED STEEL IN WATER

First heat the piece gradually and uniformly to a temperature of 750 degrees Fahrenheit. When this temperature is reached it should be plunged into a bath of pure water which was previously heated to a temperature of 150 degrees Fahrenheit. Permit the steel to cool to the temperature of the bath when it will be ready to work.

NUMBER 41

Spring Testing Scale and the Color of the Alphabet and Also the Vibration of Color.



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